UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/660,390	09/12/2000	Akihiro Nitayama	00629.00002	6915

22907 7590 12/17/2001

BANNER & WITCOFF
1001 G STREET N W
SUITE 1100
WASHINGTON, DC 20001

EXAMINER
WEISS, HOWARD

ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 12/17/2001

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/660,390	Applicant(s) NITAYAMA ET AL.	
	Examiner Howard Weiss	Art Unit 2814	

-- Th MAILING DATE of this communication appears on the cover sh t with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 November 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) *13-17* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-17* are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 September 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Pri rity under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Attorney's Docket Number: 00629.00002

Filing Date: 9/12/00

Continuing Data: CIP of 08/982,478 (12/2/97) Now U.S. Patent No. 6,236,079

Claimed Foreign Priority Date: none

Applicant(s): Nitayama et al. (Katsuhiko, Ishibashi, Kohyama)

Examiner: Howard Weiss

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1 to 12, drawn to semiconductor device, classified in Class 257, Subclass 305;

   II. Claims 13 to 17, drawn to a process for making a semiconductor device, classified in Class 438, Subclass 14+.

2. The inventions are distinct, each from the other because of the following reasons: Inventions II and I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, unpatentability of the Group I invention would not necessarily imply unpatentability of the Group II invention since the Group I invention could be made by depositing a semiconductor layer instead of epitaxially growing the layer (Claim 13).

3. Because these inventions are distinct for the reasons given above and, as shown by the above different classifications, the fields of search are not co-extensive and separate examination would be required, restriction for examination purposes as indicated is proper.

4. The Applicants' election of Group I, Claims 1 to 12, in Paper No. 6, is acknowledged. Because the Applicants did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (M.P.E.P. § 818.03(a)).

5. Claims 13 to 17 are withdrawn from consideration as being for a non-elected invention. The Applicants are requested to cancel the non-elected claims as part of a complete response to this office action. Cancellation of the non-elected claims would not preclude the later filing of a divisional application on the non-elected invention (please see 35 USC 120 and121).

6. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a diligently-filed petition under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(h).

Drawings

7. Figures 1 and 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

8. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

9. The disclosure is objected to because of the following informalities: ---now U.S. Patent No. 6,236,079--- should be inserted after "1997" in Line 8 of Page 1. Appropriate correction is required.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claim 12 is rejected under 35 U.S.C. 102(b) as being anticipated by Ushiku et al. (U.S. Patent No. 5,675,176).

Ushiku et al. show all aspects of the instant invention (e.g. Figure 4) including a semiconductor substrate **1,** an element isolation insulating film including a first insulating film **3** buried to define an active element area and a second insulating film **6** shallower the first film and elements **8-10** formed in the active area.

12. Claim 12 is rejected under 35 U.S.C. 102(b) as being anticipated by Bronner et al. (U.S. Patent No. 5,606,188).

Bronner et al. show all aspects of the instant invention (e.g. Figure 6) including a semiconductor substrate **12,** an element isolation insulating film including a first insulating film **18** buried to define an active element area and a second insulating film **14** shallower the first film and elements **36-40** formed in the active area.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Initially, and with respect to Claims 6 to 10, note that "product by process" claims are directed to the product per se, no matter how actually made. See *In re Thorpe et al., 227 USPQ 964 (CAFC, 1985)* and the related case law cited therein which make it clear that it is the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. As stated in Thorpe,

> even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. *In re Brown, 459 F.2d 531, 535, 173 USPQ 685, 688 (CCPA 1972); In re Pilkington, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969); Buono v. Yankee Maid Dress Corp., 77 F.2d 274, 279, 26 USPQ 57, 61 (2d. Cir. 1935).*

Note that Applicant has burden of proof in such cases as the above case law makes clear.

15. Claims 2 and 6 to 10 are rejected under 35 U.S.C. § 103(a) as obvious over Park et al. (U.S. Patent No. 5,521,115).

Park et al. show most aspects of the instant invention (e.g. Figures 2 to 10) including:

- a semiconductor substrate **10**
- a plurality of trench capacitors with node layers **55** and arranged at a regular pitch
- a semiconductor layer comprising a first layer **32** and a second layer **58** formed on said first layer
- an element isolation insulating film **30** buried in said semiconductor layer and defining active element areas over two adjacent trench capacitors
- two transistors **14** which share one **18** source/drain diffusion layer and an other **20** source/drain layer and each transistors gate **16**, **62** connected a word line continuous in one direction
- a contact layer **26** for connecting the other source/drain layer to the node layers and bit line contacts **78**

Park et al. do not explicitly show bit lines intersecting the word lines. However, this is common in the art to form bit lines to intersect word lines and Park et al. generally state that it is left to one of ordinary skill to construct such lines (Column 8 Lines 54 to 61).

As to the "product-by-process" limitations, how and in what order the different elements (i.e. the contact layer, node layer and transistors) are formed pertains to intermediate process which do not affect the final device structure. See MPEP § 2113 which discusses the handling of "product by process" claims.

16. Claim 11 is rejected under 35 U.S.C. § 103(a) as obvious over Park et al. in view of Bronner et al.

Park et al. show most aspects of the instant invention (Paragraph 15) except for the substrate isolation insulating film made of two films as claimed. Bronner et al. teach (Paragraph 12) to make two layer isolation films as claimed to allow scalability below 2 volts (Column 1 Lines 43 to 45). It would have been obvious to a person of ordinary skill in the art at the time of invention to make two layer isolation films as taught by Bronner et al. in the device of Park et al. to allow scalability below 2 volts.

17. Claim 1 is rejected under 35 U.S.C. § 103(a) as obvious over Park et al. in view of IBM Technical Disclosure Bulletin 1991 (hereinafter ITDB 1991)

Park et al. show most aspects of the instant invention (Paragraph 15) except for the pair of gate electrodes positioned overlying the trench capacitor. IBM 1991 teach (e.g. Figure 1) to form a pair of gate electrodes (i.e. **poly gate**) over a trench capacitor to make a highly dense DRAM (see first paragraph of Disclosure text). It would have been obvious to a person of ordinary skill in the art at the time of invention to form a pair of gate electrodes over a trench capacitor as taught by IBM 1991 in the device of Park et al. to make a highly dense DRAM.

18. Claims 3 to 5 are rejected under 35 U.S.C. § 103(a) as obvious over Park et al. in view of Ishii.

Park et al. show most aspects of the instant invention (Paragraph 15) except for the trench capacitors shaped substantially in a square with sides equal to 2F, either the diagonals or the sides of said squares being oriented in two orthogonal directions of said word and bit lines and arranged at the pitch as claimed. Ishii teaches to have trench capacitors **8** in a square configuration and the diagonals (Figure 7) or the sides (Figure 5) of said squares being oriented in two orthogonal directions of said word **20b** and bit **20a** lines to achieve high integration of the memory cells in a DRAM (Column 3 Lines 29 to 31). It would have been obvious to a person of ordinary skill in the art at the time of invention to have trench capacitors **8** in a

square configuration and the diagonals (Figure 7) or the sides (Figure 5) of said squares being oriented in two orthogonal directions of said word and bit lines as taught by Ishii et al. in the device of Park et al. to achieve high integration of the memory cells in a DRAM.

In reference to the dimensions of the sides of the trench capacitors, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the dimensions of the trench capacitors equal to the minimum processing dimension, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch,* 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Double Patenting

19. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

20. Claim 1 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claim 1 of U.S. Patent No. 6,236,079. Although the conflicting claims are not identical, they are not patentably distinct from each other because each claim a memory device which includes a substrate, first

and second semiconductor regions of opposite conduction types, trench capacitors, a pair of gate electrodes positioned overlying each capacitor, insulating layers, a conductive layer aligned to said insulating layers and a pair of third semiconductor regions as claimed.

Conclusion

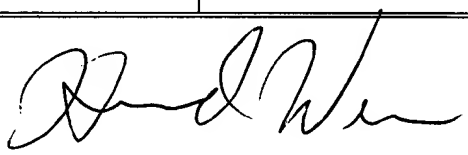
21. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Art Unit 2814 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(703) 308-7722** or **-7724**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(703) 308-4840** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via **Howard.Weiss@uspto.gov**.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group 2800 Receptionist at **(703) 308-0956**.

23. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 257/ 301, 305	12/12/01
Other Documentation: none	
Electronic Database(s): EAST, IEL	



Howard Weiss
Patent Examiner
Art Unit 2814

HW/hw
13 December 2001